ACTA ARACHNOL., **35**: 11-14, 1986

DEVELOPMENTAL RETARDATION IN *DOLOMEDES SULFUREUS* L. KOCH (ARANEAE: PISAURIDAE) UNDER SHORT PHOTOPERIOD

Kazuyoshi MIYASHITA

Department of Biology, Faculty of Science, Tokyo Metropolitan University,
1-1, Fukazawa 2 chome, Setagaya-ku, Tokyo, 158 Japan

Synopsis

MIYASHITA, Kazuyoshi (Department of Biology, Faculty of Science, Tokyo Metropolitan University, 1-1, Fukazawa 2 chome, Setagaya-ku, Tokyo, 158 Japan) : Developmental retardation in *Dolomedes sulfureus* L. KOCH (Araneae: Pisauridae) under short photoperiod. *Acta arachnol.* **35**: 11-14 (1986).

The nymphs of *Dolomedes sulfureus* were reared at 25°C with long and short photoperiods. Under long photoperiod, 4 individuals out of 15 developed successfully to adult. Under short photoperiod, however, there occurred a developmental retardation in the period after 5-6th instar, and finally all individuals failed to complete their development.

Introduction

Although the importance of photoperiod on growth and development in spiders was investigated by SCHAEFER (1977) and HAMAMURA (1982) in relation to overwinter, it can be said that our knowledge on this point is still insufficient as compared with that in insects and mites. In 1984, I tried to rear the nymphs of *Dolomedes sulfureus* L. KOCH under long and short photoperiods in order to investigate the reaction of this species to photoperiod, but failed to get satisfactory results. However, the results obtained contained some interesting points, thus I would like to describe briefly those here.

Materials and Methods

A female with an egg sac was captured on 20th July of 1984 in Abiko-shi, Chiba Prefecture. The first instar nymphs* emerged on 24th July from that egg sac. After 3 days, 30 nymphs were picked up and kept individually in glass vessels, 4.2 cm in diameter×7.3 cm in height in the first half of rearing and 5.5 cm×10.5 cm thereafter. In the vessel, a small glass tube with wet cotton and a piece of thick paper as a suitable substrate were placed. Fifteen among them were reared under 16L-8D and the others under 10L-14D. Room temperature was kept at 25±0.5°C. The food provided was the fruit fly, *Drosophila melanogaster*, and the feeding interval was 2-3 days. The number of flies provided was increased as nymphs' development proceeded.

Results and Discussion

Fig. 1 shows the developmental processes of nymphs under long and short photoperiods. Under long photoperiod, 4 individuals, including 2 females and 2 males, developed successfully to adults, but the others died on the way to develop. In the successfully developed individuals, the number of days required

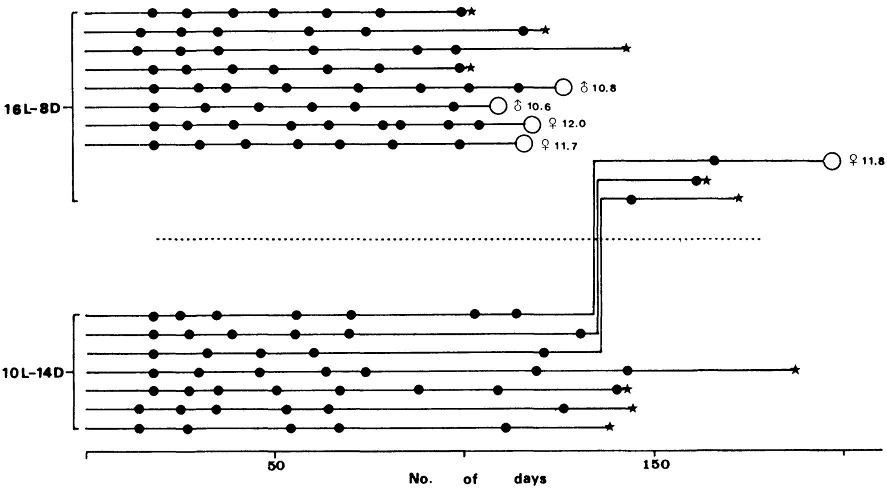

Fig. 1. Developmental processes of the specimens reared at 25°C with 16L-8D and 10L-14D. Solid circles indicate molts and hollow ones the final molts. Solid stars mean deaths. Three individuals were transferred from short photoperiod to long one on 134th day. The figures followed the tails of each line show the final body length in millimeters.

---

* In this paper, the first instar nymph means the individuals just emerged from an egg sac, and the number of instars is counted after this stage.

for development was 110-130 days, and the number of molts was 7-10. Death tended to occur most frequently at the early and latter stages. In the graph, the individuals died at the early stage were omitted.

Under short photoperiod, however, there occurred a distinct retardation in the development after 5-6th instar, and no individual completed its development in spite of the occurrence of one or 2 additional molts with somewhat prolonged intervals. Therefore, 3 individuals were transferred from short photoperiod to long one on 134th day. This treatment brought about a successful development in one individual, spending 197 days with 9 moltings, but failures in the other two. According to NAKAHIRA (1977), a female which he reared molted 13 times for development, excluding the molt occurred in an egg sac.

HAMAMURA (1982) reported that, in *Philodromus subaureolus*, the development of the middle stage nymphs after overwinter was retarded under short photoperiod and finally failed to develop. In addition, when the nymphs which were reared once under short photoperiod for 30-40 days were transferred to long one, they accomplished their development normally. In the present rearing, about the same phenomenon was also observed. It is considered, therefore, that the observed retardation in development under short photoperiod must be related closely to the overwintering characteristics of this specimen. SCHAEFER (1977) described that, in several species of spiders, an exposure to low temperature was necessary to overwintering individuals for the resumption of normal development in spring. However, it seems that, even when temperature is constant, a change in photoperiod from short to long around the stage of 5-6th instar has an effect to restore the development, although the evidence is only one case as shown in Fig. 1.

According to SCHAEFER (1977), the adult obtained from the laboratory rearing tends to be small in body size as compared with that collected from the field. As shown in Fig. 2, the present rearing also brought about the adult small in size, and in addition body colour was pale compared to that of the individuals living in the field. The average body length was 11.8 mm in the female and 10.7 mm in the male, respectively. On the other hand, the body length measured on the mother of the experimental animals was 17.7 mm. SHINKAI and TAKANO (1984) described that the body length of this species is 20-22 mm in the female and 14-16 mm in the male. It is probable, therefore, that the laboratory reared individuals are significantly small in size. However, the cause which brings about such a reduction in body size is unknown. A

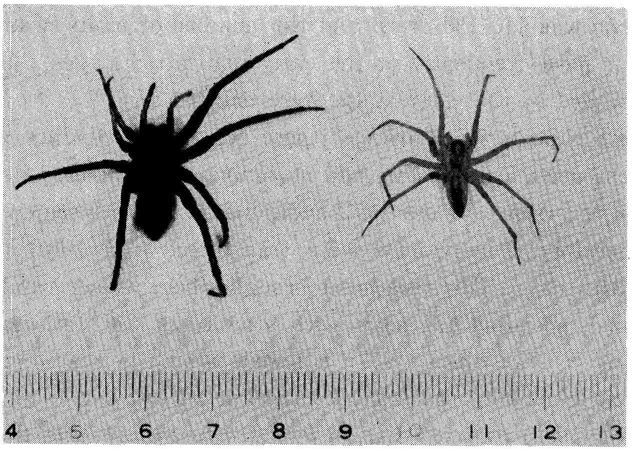

Fig. 2. An adult female obtained from the rearing (right) and the mother (left).

possible cause may be a nutritional effect due to a simple menu.

Acknowledgement

I thank Dr. Y. KUNIMI, Tokyo Sericultural Extension Service, for identification of the species. I also thank Mr. K. MASUKO, Tokyo Metropolitan University, for preparing photographs.

摘 要

宮下和喜（東京都立大学理学部生物学教室，〒158 東京都世田谷区深沢 2-1-1）：短日条件下でのイオウイロハシリグモの発育停滞。

25°Cの長日と短日下で卵のうより出てきた幼生（これを1齢とした）の飼育を試みたところ，長日下では15匹中4匹が成体となった。短日下では5-6齢から齢期間の延長が起こって発育が停滞した。この中の3匹を長日下に移したところ1匹は成体となったが，移さなかったものはすべて死亡した。

References

HAMAMURA, T., 1982. Effects of photoperiod on nymphal development in *Philodromus subaureolus* BOES. et STR. (Araneae: Thomisidae). *Jap. J. Appl. Ent. Zool.*, **26**: 131–137.

NAKAHIRA, K., 1977. Genetic polymorphism found in the species "*Dolomeds sulfureus* L. KOCH" (Araneae: Pisauridae). *Acta arachnol.*, **27** (special no.): 45–49.

SCHAEFER, M., 1977. Winter ecology of spiders (Araneida). *Z. Ang. Ent.*, **83**: 113–134.

SHINKAI, E. and S. TAKANO, 1984. A Field Guide to the Spiders of Japan. 1–204, Tokai Univ. Press, Tokyo.